

Information Technologies for Engineering Education in the Web Environment of Internet

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Abstract - This paper deals with information technologies and tools developed at the Faculty of Mechanical Engineering VSB - Technical University of Ostrava (Czech Republic) on support of pedagogical activities and special subject education. Simultaneously, there are presented findings and experiences from implemented projects in the faculty framework and places where work was done at the Department of Control Systems and Instrumentation. The main attention is on perspective trends for increasing the productivity and efficiency of pregraduation and postgraduation education. At the present time the main activities consist of education programs and the creation of hypertext education coursebooks connected with tools that are familiar for information technologies on the Web INTERNET. This paper also summarizes the findings from the realization of twelve courses for physically handicapped citizens, where modern forms of information technologies are used (group education on INTERNET/INTRANET environment, remote access to the computer university net, work activity modeling by type „home working“). The presented experiences indicate the suitability of these information tools, but also show new increasing problems with the disparagement of communicative and creative student ability. It is necessary to encourage the other work forms of education.

New Information Technologies and Tools on Engineering Education

Stormy development of the whole world computer net INTERNET is accompanied with large amount of books, papers and special magazine contributions. Significant parts of these items are dedicated to the WWW applications. Web technology enable to created static or dynamic pages with different kind of information including pictures, video, sound, database connection to the live data sources and so on. A language HTML (HYPERTEXT MARKUP LANGUAGE) serves as a standard format for Web pages presentation.

Recently a new term INTRANET occurred between information technology terms. It marks information system with the same software basis as an Internet, but with connection only from enterprise or university local net LAN background. The main advantage of this solution is consistency of the Web

design tools and the same client browsers (for instance Microsoft Internet Explorer, Netscape Communicator). Both types of the information systems are often at the coincidence and it is unprofitable to segregate them from the point of function.

On the Department of Control Systems and Instrumentation of Technical University of Ostrava is intensively propagated also application area of the new information technologies and tools for support of engineering education [1, 4]. These information technologies have to arrange:

- better access for students and teachers to the important and actual study information (for instance *Subject study programs* or date terms of examinations),

- direct accessibility of actual hypertext education coursebooks for full time or part time students,

- communication with the database information sources with faculty or department content (for instance library of thesis),

- interactive contact with relevant student question-forms,

- advanced forms of email services or groupworking (groupware).

At the present time the main activities consist of the education programs and the creation of hypertext education coursebooks connected with tools that are familiar for information technologies on the Web INTERNET. They are fit at education textbooks on hypertext form with support of language HTML and DHTML (for instance „User manual with solved examples of the SIPRO simulation program“) [2]. Other examples are presentation projects using the interaction of dynamical HTML pages with database systems (for instance an overview of publication and other literature sources, question-forms of student examination enrollment). In this environment distance education of special courses for health handicapped students and distance pregraduation education has also been implemented.

Education Textbooks on WWW pages

From the beginning, WWW technology was utilized for the creation of education textbooks from lecture syllabuses up to electronic textbooks. HTML language tenders good format possibility (cascade styles, text marking, tables, input objects) with conservation of text record economy.

Dynamical pages on WWW

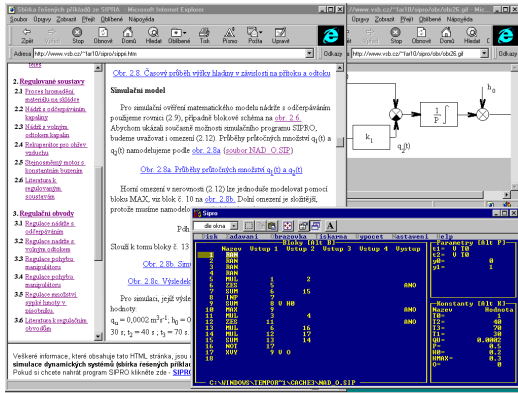


Figure. 1 Education textbook on HTML format for simulation problems solving by the program SIPRO (Czech version)

On the Fig. 1 we can see education electronic textbook with support of all important occasions HTML language. Firstly there are frames, which split up the screen of browser to individually management parts a secondly there are redundant text interfacing connections with relationship references.

Problem on WWW pages is restricted format possibilities for writing of equations. It is solved by the way of equation transformation to the form of embedded pictures (*.jpg or *.gif). We do not input the other pictures direct to the source text page, but they are available by the address reference and they are usually open on the separate window. Next we can use the possibility for application files insertion (on the Fig. 1 it is simulation problem solving by the program SIPRO, which the browser be able to open on the environment of SIPRO at the separate window - see the right down part of figure) [3]. Described solutions apply the experiences of authors department from the WWW document creation.

One of the important disadvantages of static HTML text applications is complicated reference maintenance, especially on text modification. The text better overlabor the reference structure is more complicated and text modification is more complex. This problem is solved by the way of specialized tools, which save the particular parts of document to a database including their reference connection. Then the standard database integrity tools arrange the consistence of references.

Many of authors have the problem with WWW publishing owing to easy alienation of presented texts. Because it is important problem, gradually the several solutions was expanded. Among them are:

- ☆ text scanning and its presentation as the pictures (*.jpg, *.gif or *.jpn) [6]
- ☆ using specialized program tools as ACROBAT READER. It is text and pictures browser with technology Plug-In, which must be installed on the client computer [7].

On the electronic form now we can read proceedings of many conferences [5] or other education text [1].

Problem with data actualization on the Web pages is increasing with the speed of their changes. Standard solution is using of database tools, accordingly dynamical connection of information on database with WWW pages. Now it is available several various approaches from the main world software firms (Sybase, Microsoft, SAP, etc.).

On the Faculty of Mechanical Engineering TU of Ostrava we tried some of these approaches and now we are using application database server on PowerBuilder environment. It is used for support of INTERNET/INTRANET information system of faculty ME [1]. There are several partial tasks in this INTRANET information system:

- publications support documentation and searching services,
- system registration for specialized actions (seminary, conference),
- electronical board for messages and news and asynchronous access to them,
- system of subjects evidence and application of students to the examines.

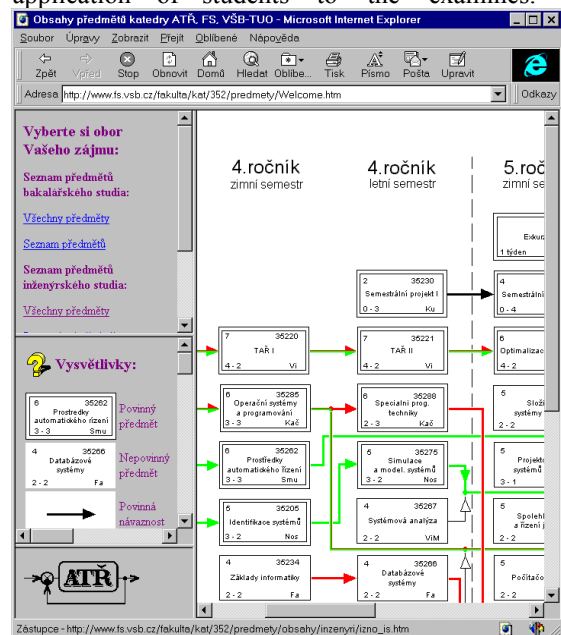


Figure. 2 Example of static WWW page - screen with bachelor education plan on graphic form (Czech version)

Application server has actual data on its database, included predefined templates HTML documents. With their variation we may simply change also visage of resultant dynamical pages and by this way also information content. For education textbooks creation is better by our experiences Internet Database Connector (MICROSOFT) with more operative support tools.

Information Technologies on Education of Handicapped Students

On the Department CSI TUO were solved in recent years three projects joined with bachelor education of handicapped students with using of computer aid, remote access to the University TUOLAN and INTERNET/INTRANET tools [8, 9].

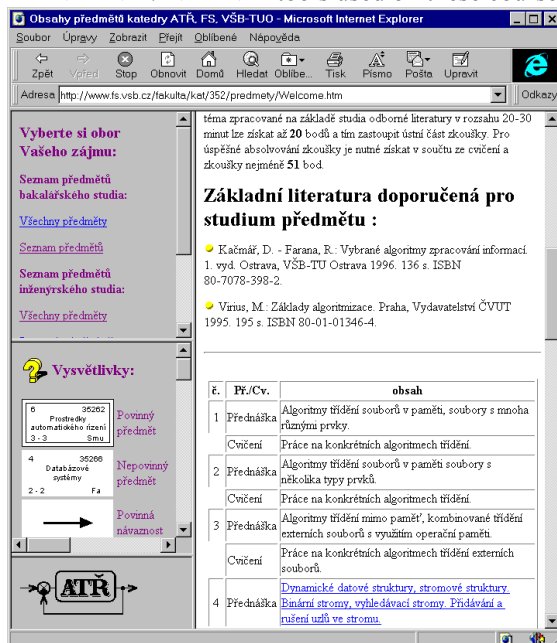
There were design detail program of bachelor study direction "Applied informatics and control", with content of subjects and computer tools for their support. Now we have five years experiences from this type of education.

Beside the university pregraduation study has the Department CSI proposal of single or double semester courses (requalification and innovation courses) for handicapped students (physically handicapped on the wheelchair). On 1997/98 years we co-ordinate 12 courses on REHABILITATION HEALTH INSTITUTE of Hrabyně (15 km from Ostrava) for 77 participants (between them were 48 "wheelchair" students and from them 29 handle only by one hand, 17 by the tools on wrist and one only by mouth). Every course has 42 hours of education on computer laboratory on RHI.

Fig. 3 Example of WWW page - screen with subject education plan on table form and connection of concrete lecture No. 4 to the hypertext source (Czech version)

Laboratory was connected with computer net TUOLAN by the modem communication and direct access to INTERNET. Students had possibility to utilize all services connected with "homeworking", as a new trend on employment of handicapped working people [9].

Information technology INTERNET/INTRANET tools used on these courses:



- electronic mail with advanced services (sending of document, pictures, files, chat services - as NetMeeting),
- remote access to the local LAN with full user rights,
- Internet browsing and searching of relevant information sources.

Electronic form of communication with TUOLAN cannot replace the visit of lectures or practices. It only complements usual forms of full time or part time study and especially for handicapped students is good remote form of contact with teachers and university information sources. This is useful also for students with prolonged unsoundness, which may be connected with study problems.

After finishing of the course "Basic work with computer" participant can work with computer text processing, design of graphic materials, small clerical work, information services, design of www pages. We suppose that cooperation with REHABILITATION HEALTH INSTITUTE of Hrabyně will be continued by the way of new innovation courses with financial support of grant project from EU.

Conclusion

Present experiences with design and realization of static and dynamical WWW pages for education purposes show their advantage for self-dependent, time freelance access of students to the information sources. Their development is also motivating by the effort to unlock university study for handicapped students. They have not possibility to complete whole classical education but they can study on part time form with individual modifications, firstly with

self-dependent work with remote access to the Internet/Intranet and university net.

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